

## SMOS soil moisture data assimilation in the NASA Land Information System: Impact on LSM initialization and NWP forecasts

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Land surface models are important components of numerical weather prediction (NWP) models, partitioning incoming energy into latent and sensitive heat fluxes that affect boundary layer growth and destabilization. During warm-season months, diurnal heating and convective initiation depend strongly on evapotranspiration and available boundary layer moisture, which are substantially affected by soil moisture content. Therefore, to properly simulate warm-season processes in NWP models, an accurate initialization of the land surface state is important for accurately depicting the exchange of heat and moisture between the surface and boundary layer. In this study, soil moisture retrievals from the Soil Moisture and Ocean Salinity (SMOS) satellite radiometer are assimilated into the Noah Land Surface Model via an Ensemble Kalman Filter embedded within the NASA Land Information System (LIS) software framework. The output from LIS-Noah is subsequently used to initialize runs of the Weather Research and Forecasting (WRF) NWP model.

The impact of assimilating SMOS retrievals is assessed by initializing the WRF model with LIS-Noah output obtained with and without SMOS data assimilation. The southeastern United States is used as the domain for a preliminary case study. During the summer months, there is extensive irrigation in the lower Mississippi Valley for rice and other crops. The irrigation is not represented in the meteorological forcing used to drive the LIS-Noah integration, but the irrigated areas show up clearly in the SMOS soil moisture retrievals, resulting in a case with a large difference in initial soil moisture conditions. The impact of SMOS data assimilation on both Noah soil moisture fields and on short-term (0-48 hour) WRF weather forecasts will be presented.